This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims

1. (Original) A method for detecting metal contamination in a dielectric material disposed upon a semiconductor substrate, comprising:

annealing the semiconductor substrate, wherein annealing the semiconductor substrate is effective to drive the metal contamination into the dielectric material;

measuring a tunneling voltage of the dielectric material; and

determining a characteristic of the metal contamination in the dielectric material, wherein the characteristic is a function of the measured tunneling voltage.

2. (Original) The method of claim 1, wherein the annealed dielectric material is substantially free of damage.

3. (Original) The method of claim 1, wherein annealing the semiconductor substrate comprises heating the semiconductor substrate to an annealing temperature, and wherein the metal contamination comprises one type of metal contamination.

4. (Original) The method of claim 1, wherein the metal contamination comprises at least two types of metal contamination.

5. (Original) The method of claim 1, wherein annealing the semiconductor substrate comprises heating the semiconductor substrate to an annealing temperature of less than approximately 1100 °C.

6. (Original) The method of claim 1, wherein the metal contamination comprises copper, and wherein annealing the semiconductor substrate comprises heating the semiconductor substrate to an annealing temperature of approximately 350 °C to approximately 500 °C.

7. (Original) The method of claim 1, wherein the metal contamination comprises copper, wherein annealing the semiconductor substrate comprises heating the semiconductor substrate for a period of time, and wherein the period of time comprises approximately one minute to approximately thirty minutes.

8. (Original) The method of claim 1, wherein measuring the tunneling voltage comprises depositing a charge on an upper surface of the dielectric material, and wherein depositing the charge comprises using a non-contact corona charging technique.

9. (Original) The method of claim 1, wherein measuring the tunneling voltage comprises depositing a charge on an upper surface of the dielectric material, and wherein the deposited charge comprises approximately $1x10^{-6}$ C/cm^2 to approximately $1x10^{-4}$ C/cm^2 for positive tunneling voltage.

10. (Original) The method of claim 1, wherein measuring the tunneling voltage comprises depositing a charge on an upper surface of the dielectric material, and wherein the deposited charge comprises approximately $-1x10^{-6}$ C/cm^2 to approximately $-1x10^{-4}$ C/cm^2 for negative tunneling voltage.

11. (Original) The method of claim 1, wherein measuring the tunneling voltage comprises:

depositing a charge on an upper surface of the dielectric material;

waiting for a predetermined period of time after depositing a charge on an upper surface of the dielectric material; and

determining the tunneling voltage.

12. (Original) The method of claim 1, wherein measuring the tunneling voltage comprises depositing a charge on an upper surface of the dielectric material, and wherein depositing a charge on an upper surface of the dielectric material comprises depositing the charge on predetermined regions of the upper surface of the dielectric material.

13. (Original) The method of claim 1, wherein measuring the tunneling voltage comprises depositing a charge on an upper surface of the dielectric material, and wherein depositing the charge on the upper surface of the dielectric material comprises depositing the charge on a portion of the upper surface or on substantially the entire upper surface.

14. (Original) The method of claim 1, wherein measuring the tunneling voltage of the dielectric material comprises using a non-contact work function measurement technique.

15. (Original) The method of claim 1, further comprising comparing the tunneling voltage of the dielectric material to a tunneling voltage of a reference dielectric material, wherein the reference dielectric material is substantially free of metal contamination.

16. (Original) The method of claim 1, further comprising comparing the tunneling voltage of the dielectric material to a tunneling voltage of a reference dielectric material, wherein the reference dielectric material comprises a predetermined level of at least one type of metal contamination, and wherein at least the one type of metal contamination is predetermined.

17. (Original) The method of claim 1, further comprising determining a tunneling field of the dielectric material, wherein the tunneling field is a function of the tunneling voltage, the method further comprising comparing the tunneling field of the dielectric material to a tunneling field of a reference dielectric material, wherein the reference dielectric material is substantially free of contamination.

18. (Original) The method of claim 1, further comprising determining a tunneling field of the dielectric material, wherein the tunneling field is a function of the tunneling voltage, the method further comprising comparing the tunneling field of the dielectric material to a tunneling field of a reference dielectric material, wherein the reference dielectric material comprises a predetermined level of at least one type of metal contamination, and wherein at least the one type of metal contamination is predetermined.

19. (Original) The method of claim 1, wherein determining a characteristic of the metal contamination in the dielectric material comprises comparing the tunneling voltage of the dielectric material to a tunneling voltage of a reference dielectric material.

20. (Original) The method of claim 1, further comprising determining a tunneling field of the dielectric material, wherein the tunneling field is a function of the tunneling voltage.

21. (Original) The method of claim 1, further comprising determining a tunneling field of the dielectric material, wherein determining the tunneling field comprises subtracting a tunneling voltage of a reference dielectric material from the tunneling voltage of the dielectric material.

22. (Original) The method of claim 1, wherein the characteristic of the metal contamination further comprises a function of a temperature of the annealing of the semiconductor substrate.

23. (Original) The method of claim 1, wherein the characteristic of the metal contamination further comprises a function of an amount of the deposited charge.

24. (Original) The method of claim 1, wherein determining the characteristic of the metal contamination in the dielectric material comprises determining a characteristic of at least two types of metal contamination in the dielectric material.

25. (Original) The method of claim 1, wherein determining a characteristic of the metal contamination in the dielectric material comprises determining a characteristic of at least one type of metal contamination in a portion of the dielectric material, and wherein the portion of the dielectric material comprises a locally contaminated region of the dielectric material.

26. (Original) The method of claim 1, further comprising measuring the tunneling voltage of the dielectric material at more than one position on the semiconductor substrate, determining a tunneling field of the dielectric material at each measurement position, and determining the characteristic of at least one type of metal contamination at each measurement position.

27. (Original) The method of claim 26, further comprising generating a plot of the determined tunneling field as a function of measurement position.

28. (Original) The method of claim 27, further comprising comparing the generated plot of the determined tunneling field as a function of measurement position to a plot of a predetermined tunneling field as a function of measurement position.

29. (Original) The method of claim 28, wherein the predetermined tunneling field is representative of a range of acceptable levels of at least one type of metal contamination, and wherein the acceptable levels of the metal contamination do not substantially hinder the performance of a semiconductor device formed on the semiconductor substrate.

30. (Original) The method of claim 1, further comprising annealing the semiconductor substrate subsequent to depositing the charge on an upper surface of the semiconductor substrate.

31. (Original) The method of claim 30, further comprising heating the semiconductor substrate to an annealing temperature of less than approximately 120 °C.

32. (Original) The method of claim 30, further comprising heating the semiconductor substrate to an annealing temperature of less than approximately 120 °C, wherein the metal contamination comprises copper, and wherein the dielectric material comprises silicon dioxide.

33. (Original) The method of claim 1, further comprising generating electrical stress in the dielectric material and heating the semiconductor substrate subsequent to generating the electrical stress in the dielectric material.

34. (Original) The method of claim 33, wherein generating electrical stress comprises using a non-contact corona charging technique, and wherein the electrical stress comprises approximately -1×10^{-3} C/cm^2 to approximately $+1 \times 10^{-3}$ C/cm^2.

35. (Original) The method of claim 33, wherein heating the semiconductor substrate comprises heating the semiconductor substrate to a temperature of approximately 50 °C to approximately 120 °C.

36. (Original) The method of claim 33, wherein heating the semiconductor substrate comprises heating the semiconductor substrate for a period of time of approximately one minute to approximately thirty minutes.

37. (Original) The method of claim 1, further comprising determining a presence of particulate contamination on the dielectric layer, wherein the presence of particulate contamination is a function of the measured tunneling voltage.

38. (Original) The method of claim 37, further comprising flowing a gas across an upper surface of the dielectric material as a charge is deposited onto the dielectric material.

39. (Original) The method of claim 38, wherein the gas has a moisture content, and wherein the moisture content of the gas is greater than a moisture content of air surrounding the semiconductor substrate.

40. (Original) The method of claim 38, wherein the gas comprises ammonia.

41. (Original) The method of claim 1, wherein the dielectric material comprises silicon dioxide, silicon nitride, or silicon oxynitride.

42. (Original) The method of claim 1, wherein the semiconductor substrate comprises monocrystalline silicon, silicon germanium, or gallium arsenide.

43. (Original) The method of claim 1, wherein the metal contamination comprises copper.

44. (Original) The method of claim 1, wherein the metal contamination comprises iron, chromium, cobalt, or aluminum.

45. (Original) The method of claim 1, further comprising comparing the tunneling voltage to a set of data, wherein the set of data comprises tunneling voltages associated with a characteristic of metal contamination.

46. (Original) The method of claim 1, further comprising

re-annealing the semiconductor substrate subsequent to measuring the tunneling voltage; and

re-measuring the tunneling voltage of the dielectric material.

47. (Original) A method for increasing degradation of a dielectric material resulting from metal contamination, comprising:

generating electrical stress in the dielectric material, wherein the dielectric material is disposed upon a semiconductor substrate; and

heating the semiconductor substrate subsequent to generating electrical stress in the dielectric material.

48. - 54. (Previously Canceled)

55. A method for determining a characteristic of metal contamination in a dielectric material disposed upon a semiconductor substrate, comprising:

annealing the semiconductor substrate prior to depositing a charge on an upper surface of the dielectric material, wherein annealing the semiconductor substrate is effective to drive the metal contamination into the dielectric material;

depositing a charge upon the upper surface of the dielectric material;

annealing the semiconductor substrate subsequent to depositing a charge on the upper surface of the dielectric material;

measuring a tunneling voltage of the dielectric material; and

determining a characteristic of the metal contamination in the dielectric material, wherein the characteristic is a function of the measured tunneling voltage.

56. - 64. (Previously Canceled)

65. A method for detecting metal contamination in a dielectric material disposed upon a semiconductor substrate, comprising:

annealing the semiconductor substrate, wherein annealing the semiconductor substrate is effective to drive the metal contamination into the dielectric material;

measuring an electrical property of the dielectric material; and

determining a characteristic of the metal contamination in the dielectric material, wherein the characteristic is a function of the measured electrical property.

66. - 98. (Previously Canceled)

99. (Canceled)

100. - 132. (Previously Canceled)

133. (Canceled)

134. - 151. (Previously Canceled)

152. (Canceled)

153. - 169. (Previously Canceled)

170. (Canceled)

171. - 187. (Previously Canceled)

188. (Canceled)

189 - 205. (Previously Canceled)

206. (Canceled)

207. - 240. (Previously Canceled)